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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,362	02/07/2005	Agnes Chardonens	13311-00012-US	1864
23416 7590 01/15/2010 CONNOLLY BOVE LODGE & HUTZ, LLP P O BOX 2207 WILMINGTON, DE 19899				
EXAMINER				
KUMAR, VINOD				
ART UNIT		PAPER NUMBER		
1638				
MAIL DATE		DELIVERY MODE		
01/15/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/523,362

Applicant(s)

CHARDONNENS ET AL.

Examiner

VINOD KUMAR

Art Unit

1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5,8-11,13,15,18,19,29,32,47 and 49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,8-11,13,15,18,19,29,32,47 and 49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 May 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/4/2009 has been entered.

Status of Objections and Rejections

2. Claims 1, 5, 8-11, 13, 15, 18-19, 29, 32, 47 and 49 are pending.
3. Claims 2-4, 6-7, 12, 14, 16-17, 20-28, 30-31, 33-46, 48 and 50 are previously cancelled.
4. Claims 1, 5, 8-11, 13, 15, 18-19, 29, 32, 47 and 49 are examined on merits in the present Office action.
5. Objection to claim 49 is withdrawn in light of claim amendment filed in the paper of 11/4/2009.
6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
7. Rejection of claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, 47 and 49 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 2,

10, 11, 12, 15, 16, 19, 22, 23 and 24-27 of co-pending Application No. 11/251,208 is withdrawn in light of Applicant's arguments filed in the paper of 11/4/2009.

Claim Rejections - 35 USC § 103

8. Claims 1, 5, 8-10, 13, 18-19, 29, 32, 47 and 49 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Lanahan et al. (WIPO, PCT, WO 00/36126, Published 22 June 2000, Applicant's IDS), and further in view of Gan (Biochem. Biophys. Res. Comm., 187:949-955, 1992), Grant et al. (Biochimica et Biophysica Acta, 1490:33-42, 2000) and Samuelsen et al. (Plant Physiol., 118:51-58, 1998) for the reasons of record stated in the Office action mailed 6/5/2009.

Applicant traverses the rejection in the paper filed 11/4/2009.

Applicant continues to argue that Lanahan et al. do not teach transgenic plants with an increased tolerance to salinity, drought or low temperature. Applicant cites declaration (filed under 37 CFR § 1.132) of Gerhard Ritte to support the argument. Applicant further argues that Gan contains no suggestion to produce transgenic plants with increased tolerance to an environmental stress associated with salinity, drought or low temperature (response, page 6, lines 1-13). Applicant further argues that Grant et al. only teaches differential regulation of GRX1 and GRX2 in response to various stresses in yeast, but do not necessarily suggest that overexpressing GRX1 and/or GRX2 would produce enhanced stress resistance in a transgenic plant. Applicant while admitting that Samuelsen et al. do teach that expression of yeast Fe(III) reductase enhanced Fe(III) reduction in transgenic tobacco, however, argues that Applicant's invention is more complex because it leads to stress tolerant transgenic plant.

Applicant further argues that there is no motivation to combine the cited references to arrive at the claimed invention. Applicant while admitting that Grant et al. do teach that GRX1/GRX2 expression is enhanced in response to stress conditions, however, questions that one of ordinary skill in the art would not have expected that it would produce abiotic stress tolerance when overexpressed in a plant. Applicant cites declaration (filed under 37 CFR § 1.132) of Gerhard Ritte to support these arguments (response, pages 6-8).

Applicant's arguments are fully considered but are deemed to be unpersuasive.

It is maintained that Lanahan et al. clearly teach expressing a heat-stable thioredoxin protein (an oxidoreductase stress related protein). Furthermore, Lanham et al. also teach expressing microbial (includes yeast) heat-stable thioredoxin protein in transgenic plants. See for example, abstract; pages 1-2, 6-7, 11-13, 17, 20-31; examples 1-2; SEQ ID NOs: 1-7.

It is further maintained that Gan teach a nucleic acid sequence encoding a yeast thioltransferase (also called glutaredoxin) having 100% identity to instant SEQ ID NO: 4.

It is further maintained that Grant et al. clearly teach that GRX1 and GRX2 (yeast glutaredoxins) are up-regulated by a range of stress conditions including oxidative, heat shock, osmotic (includes salinity) etc (pg 40, 3rd paragraph). It is further maintained that Grant et al. clearly teach that yeast glutaredoxins are small heat-stable oxidoreductases which play an important role in protecting a cell exposed to environmental stresses. Environmental stress would include salt, drought including low temperature. Applicant's

attention is directed to abstract, pages 33, 34; page 35, figure 1; page 36, figure 2; page 37, figure 3; page 38, figure 4; page 39, figure 5; pages 40-41.

Applicant is reminded that it was well known in the art at the time the claimed invention was made that a yeast gene upon expression in plant would produce expected phenotype with a reasonable expectation of success. This is clearly evident from the teachings of Samuelsen et al.

Samuelsen et al. teach that yeast genes can be successfully expressed in plants to obtain expected phenotype and/or enzymatic activity associated with the yeast protein. See in particular, pg 51, abstract; pg 54, figures 1 and 2; pg 55, figure; pg 56, figures 4. The reference also cites additional prior art references to assert that expressing yeast genes in a plant tissue produces expected results (see pg 51, right column, 3rd paragraph).

It is not surprising and unexpected in any transgenic plant analysis that few plants fail to express the introduced trans gene due to gene silencing effects. That does not imply that Samuelsen et al. fail to demonstrate that a yeast gene can be successfully expressed in a transgenic plant environment to produce expected phenotype. Applicant is reminded that majority of Samuelsen et al. transgenic plants produced the expected phenotype.

It is therefore maintained that at the time the invention was made, it would have been prima facie obvious to one of ordinary skill in the art to modify the method of making a transgenic plant as taught by Lanahan et al., to substitute the coding sequence encoding Lanahan et al. heat-stable thioredoxin protein with a recombinant

DNA encoding Gan thioredoxin protein to obtain a transgenic plant and transgenic seed expressing Gan recombinant DNA.

It would have been thus obvious and within the scope of an ordinary skill in the art to over-express Gan glutaredoxin protein in any plant including monocot (maize) or dicot (tomato) plants of Lanahan et al. using any plant transformation method including the one taught by Lanahan et al.

It is further maintained that given Grant et al. teach glutaredoxin protein (same protein as taught by Gan, emphasis added) are implicated in protecting a cell subjected to an environmental stress (oxidative or osmotic or salinity), one of ordinary skill in the art would have been motivated to over-express Gan nucleic acid sequence encoding glutaredoxin protein in any eukaryotic host cell including a plant cell to produce a transgenic plant cell which is regenerated into a stress-tolerant transgenic plant with a reasonable expectation of success.

Given, it was well known in the art at the time the instantly claimed invention was made that yeast genes can be overexpressed in a plant to produce an expected phenotype as asserted by Samuelsen et al., it would have been obvious and within the scope of an ordinary skill in the art to try to over-express Gan's Oxidoreductase coding sequence in a plant for the purpose of obtaining environmental (salt, drought etc.) stress tolerant transgenic plant with a reasonable expectation of success.

It is further maintained that it would have been obvious and within the scope of an ordinary skill in the art to use Gan nucleic acid sequence encoding the glutaredoxin protein as a DNA marker in any DNA hybridization based technique, such as Southern

blot or DNA dot blot analysis to identify stress-tolerant transgenic plant with a reasonable expectation of success.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, one of ordinary skill in the art would have arrived at the claimed invention with a reasonable expectation of success by combining the teachings of cited art as discussed above.

It is important to note that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, one of ordinary skill in the art would have arrived at the claimed invention with a reasonable expectation of success by combining the teachings of cited art.

Applicant is reminded that issue in the present obviousness analysis is whether there was any reason based on prior art teachings that would have motivated one of ordinary skill in the art to try to overexpress Gan sequence in a plant to produce an

abiotic stress tolerant transgenic plant. As discussed above, one of ordinary skill in the art would have been obviously motivated to combine the teachings of Lanahan et al., Gan, Grant et al. and Samuelsen et al. to arrive at the claimed invention with a reasonable expectation of success.

It is important to note that obviousness does not require an absolute certainty of success but merely a reasonable expectation thereof, so long as the motivation or suggestion to combine the teaching of the cited references is known or disclosed in the prior art and is obvious to one skilled in the art and this is sufficient to establish a *prima facie* case of obviousness. In the instant case, one of ordinary skill in the art would have used teachings of the prior art as discussed above to arrive at the claimed invention with a reasonable expectation of success.

It is therefore, maintained that the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

9. Claims 11 and 15 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Lanahan et al. (WIPO, PCT, WO 00/36126, Published 22 June 2000, Applicant's IDS), and further in view of Gan (Biochem. Biophys. Res. Comm., 187:949-955, 1992), Grant et al. (Biochimica et Biophysica Acta, 1490:33-42, 2000), Samuelsen et al. (Plant Physiol., 118:51-58, 1998) and Stomp et al. (Plant Physiol., 92:1226-1232, 1990) for the reasons of record stated in the Office action mailed 6/5/2009.

Applicant traverses the rejection in the paper filed 11/4/2009.

Applicant makes the same arguments as discussed above.

It is therefore, maintained that it would have been thus obvious and within the scope of an ordinary skill in the art to over-express Gan glutaredoxin protein in any plant cell or plant including a gymnosperm plant cell or plant using any plant transformation method including the one taught by Stomp et al. to arrive at the claimed invention with a reasonable expectation of success as discussed above.

Conclusions

10. Claims 1, 5, 8-11, 13, 15, 18-19, 29, 32, 47 and 49 remain rejected.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VINOD KUMAR whose telephone number is (571)272-4445. The examiner can normally be reached on 8:30 a.m. to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Vinod Kumar/
Primary Examiner, Art Unit 1638